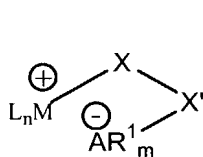
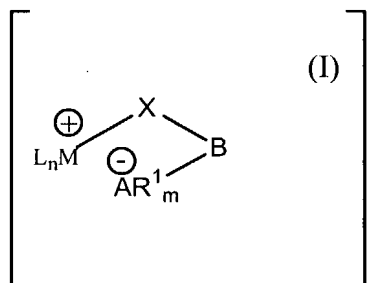


AMENDMENTS TO THE CLAIMS

1. (currently amended) A zwitterionic transition metal compound of the formula I



where

L are identical or different and are each a π -ligand or an electron donor, n is equal to 1, 2, 3 or 4,

M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,

X is a heteroatom or a hydrocarbon group having 1-40 carbon atoms,

X' is a hydrocarbon group having 1-40 carbon atoms,

A is an atom of group Ib, IIb, IIIa, IIIb, IVa, Va, Vb, VIb, VIIb or VIIIb of the Periodic Table of the Elements,

R¹ are identical or different and are each a perhalogenated C₁-C₄₀-hydrocarbon radical, and m is equal to 1, 2, 3, 4 or 5.

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2. (original) A transition metal compound as claimed in claim 1, wherein the radicals L are identical or different and are each a π -ligand.
3. (original) A transition metal compound as claimed in claim 1, wherein the radicals L are identical or different and are each an unsubstituted or substituted cyclopentadienyl group.
4. (original) A transition metal compound as claimed in claim 1, wherein the radicals L are linked to one another via a bridge.
5. (original) A transition metal compound as claimed in claim 1, wherein $n=2$ when M is a metal atom of group IVb of the Periodic Table of the Elements.
6. (original) A transition metal compound as claimed in claim 1, wherein
M is a metal atom of group IVb of the Periodic Table of the Elements, n is equal to 2,
L are identical or different and are each a substituted or unsubstituted cyclopentadienyl group, where two radicals L are optionally linked to one another via a bridge Z and
Z is CR^2R^3 or SiR^2R^3 or a unit $Si-(CR^2R^3)_x-Si$ which links two fragments $L_nM^+XX'-A-R_m^1$ with one another, where x is an integer from 0 to 10,
X and X' together form a three-membered to five-membered hydrocarbon chain which can be saturated or unsaturated and are unsubstituted or substituted by one or more C_1 - C_{20} -hydrocarbon radicals,
 R^2 and R^3 are identical or different and are each a hydrogen atom, a halogen atom, a C_1 - C_{20} -alkyl group, a C_1 - C_{10} -fluoralkyl group, a C_1 - C_{10} -alkoxy group, a C_6 - C_{14} -

aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl group, or R² and R³ together with the atoms connected them form one or more rings, and R² and R³ are optionally bonded to L;

A is an atom of group Ib, IIb, IIIa, IVa, Va, Vb of the Periodic Table of the Elements,

R¹ are identical or different and are each a perfluorinated alkyl or aryl group having from 1 to 20 carbon atoms and

m is equal to 2, 3 or 4.

7. (original) A transition metal compound as claimed in claim 6, wherein

M is zirconium,

n is equal to 2,

L are identical or different and are each a substituted cyclopentadienyl group, where two radicals L are linked to one another via a bridge Z, where Z is CR² R³ or SiR² R³ and R² and R³ are as defined in claim 6,

X and X' together form an unsaturated four-membered hydrocarbon chain whose hydrogen atoms are optionally replaced by C₁-C₂₀-alkyl groups,

A is boron atom,

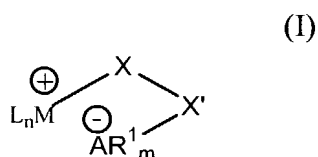
R¹ are identical and are each a pentafluorophenyl group (C₆F₅) and

m is equal to 3.

8. (original) A catalyst component comprising at least one transition metal compound as claimed in claim 1.

9. (original) A catalyst component as claimed in claim 8, additionally containing a support.

10. (currently amended) A process for preparing a compound according to claim 1 of the formula I,



where

L are identical or different and are each a π ligand or an electron donor, n is equal to 1, 2, 3 or 4,

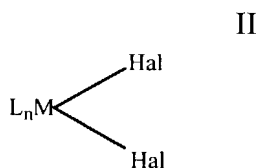
M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,

X is a heteroatom or a hydrocarbon group having 1-40 carbon atoms,

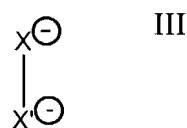
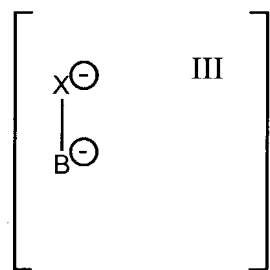
X' is a hydrocarbon group having 1-40 carbon atoms,

A is an atom of group Ib, IIb, IIIa, IIIb, IVa, Va, Vb, VIb, VIIb or VIIIb of the Periodic Table of the Elements,

R¹ are identical or different and are each a perhalogenated C₁-C₄₀-hydrocarbon radical, and m is equal to 1, 2, 3, 4 or 5, which comprises reacting a compound of the formula II

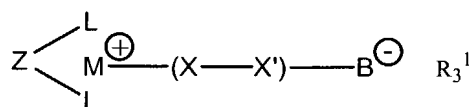


with a compound of the formula III



and reacting the reaction product with a compound of the formula AR_m^1 , where L, n, M, $[\text{X}, \text{B}]$, X , X' , A, R^1 and m in the formulae II, III and AR_m^1 are as defined for the formula I and Hal is a halogen atom.

11. (original) A zwitterionic transition metal compound of the formula



wherein: L and L' are identical or different and are each a substituted or unsubstituted cyclopentadienyl group;

Z is a bridge linking together said L and L' and is a group of the formula $\text{CR}^2 \text{R}^3$ or $\text{SiR}^2 \text{R}^3$;

R^2 and R^3 are identical or different and are each a hydrogen atom, a halogen atom, a C_1 - C_{20} -alkyl group, a C_1 - C_{10} -fluoralkyl group, a C_1 - C_{10} -alkoxy group, a C_6 - C_{14} -aryl group, a C_6 - C_{10} -fluoroaryl group, a C_6 - C_{10} -aryloxy group, a C_2 - C_{10} -alkenyl group, a C_7 - C_{40} -arylalkyl group, a C_7 - C_{40} -alkylaryl group, a C_8 - C_{40} -

arylalkenyl group, or R^2 and R^3 together with the atoms connected them form one or more rings, and R^2 and R^3 are optionally bonded to L;

M is a metal atom of group IVb of the Periodic Table of the Elements;

X-X' is a 3- to 5-membered saturated or unsaturated hydrocarbon chain which is

unsubstituted or substituted by one or more C_1 - C_{20} -hydrocarbon radicals; and

the R^1 radicals are identical or different and are each a perfluorinated alkyl or aryl group having from 1 to 20 carbon atoms.

12. (original) A catalyst system for olefin polymerization comprising a transition metal compound of claim 11 and, optionally, a catalyst support material.

13. (original) A catalyst system as claimed in claim 12, wherein said catalyst system is essentially free of an aluminoxane except when said catalyst support material is present and is a solid aluminoxane.

14. (original) The catalyst as claimed in claim 8, wherein M is titanium, zirconium or hafnium.

15. (original) The catalyst as claimed in claim 12, wherein M is zirconium.

16. (original) The catalyst as claimed in claim 14, wherein an unsubstituted or

M is Zr,

n is equal to 2,

L are identical or different and are each a substituted cyclopentadienyl group, where two radicals L are linked to one another via a bridge Z, and

Z is $\text{CR}^2 \text{R}^3$ or $\text{SiR}^2 \text{R}^3$ or a unit $\text{Si}-(\text{CR}^2 \text{R}^3)_x-\text{Si}$ which links two fragments $\text{L}_n \text{M}^+$ $\text{XX}'\text{A}-\text{R}_m^1$ with one another, where x is an integer from 0 to 10,

X and X' together form a three-membered to five-membered (C_3 - C_5)-alkyl chain which is saturated or unsaturated and optionally substituted by C_1 - C_{20} -hydrocarbon radicals,

A is a metal of group Ib, IIb, IIIb, IVa, Vb, of the Periodic Table of the Elements,

R^1 are identical or different and are each a pentafluorinated alkyl or aryl group having from 1 to 20 carbon atoms,

R^2 and R^3 are identical or different and are each a hydrogen atom, a halogen atom, a C_1 - C_{20} -alkyl group, a C_1 - C_{10} -fluoralkyl group, a C_1 - C_{10} -alkoxy group, a C_6 - C_{14} -aryl group, a C_6 - C_{10} -fluoroaryl group, a C_6 - C_{10} -aryloxy group, a C_2 - C_{10} -alkenyl group, a C_7 - C_{40} -arylalkyl group, a C_7 - C_{40} -alkylaryl group, a C_8 - C_{40} -arylalkenyl group and

m is equal to 3.

17. (original) The catalyst as claimed in claim 8, wherein

M is zirconium,

n is equal to 2,

L are identical or different and are each a substituted cyclopentadienyl group, where two radicals L are bonded to one another via a bridge Z, where Z is $\text{CR}^2 \text{R}^3$ or $\text{SiR}^2 \text{R}^3$,

X and X' together form an unsaturated four-membered (C₄)-alkyl chain whose hydrogen atoms can also be replaced by C₁ -C₂₀ -alkyl groups,

A is a boron atom,

R¹ are identical and are each a pentafluorophenyl group (C₆F₅),

R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a C₁ -C₂₀ -alkyl group, a C₁ -C₁₀ -fluoroalkyl group, a C₁ -C₁₀ -alkoxy group, a C₆ -C₁₄ -aryl group, a C₆ -C₁₀ -fluoroaryl group, a C₆ -C₁₀ -aryloxy group, a C₂ -C₁₀ -alkenyl group, a C₇ -C₄₀ -arylalkyl group, a C₇ -C₄₀ -alkylaryl group, a C₈ -C₄₀ -arylalkenyl group and m is equal to 3.

18. (original)The compound as claimed in claim 1, wherein the transition metal compound of the formula I is selected from the group consisting of

bis(cyclopentadienyl)Zr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

bis(methylcyclopentadienyl)Zr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

bis(n-butylcyclopentadienyl)Zr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

bisindenylZr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

(tert-butylamido)dimethyl(tetramethyl-η⁵-cyclopentadienyl)silaneZr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

bis(2-methylbenzoidenyl)Zr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

dimethylsilanediylbis(2-methylindenyl)Zr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

dimethylsilanediylbisindenylZr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

dimethylsilanediylbis(2-methylbenzoidenyl)Zr⁺CH₂CHCHCH₂B⁻(C₆F₅)₃;

dimethylsilanediyl(2-methylbenzoidenyl)(2-methylindenyl)Zr⁺CH₂CHCHCH₂

$B^-(C_6F_5)_3$;

dimethylsilanediyl(2-methylbenzindenyl)(2-methyl-4-phenylindenyl) Zr^+CH_2

$CHCHCH_2B^-(C_6F_5)_3$;

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl) $Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

dimethylsilanediylbis(2-methyl-4-phenylindenyl) $Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl) $Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

dimethylsilanediylbis(2-methyl-4-naphthylindenyl) $Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

isopropylidene(cyclopentadienyl)(fluorenyl) $Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

isopropylidene(cyclopentadienyl)(indenyl) $Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

$[4-\eta^5\text{-cyclopentadienyl-4,7,7-trimethyl-(}\eta^5\text{-4,5,6,7-tetrahydroindenyl)}Zr^+CH_2CHCHCH_2B^-(C_6F_5)_3$;

dimethylsilanediylbis(2-methylindenyl) $Zr^+OCH_2CH_2CH_2B^-(C_6F_5)_3$;

dimethylsilanediylbisindenyl $Zr^+OCH_2CH_2CH_2B^-(C_6F_5)_3$;

dimethylsilanediylbis(2-methylbenzindenyl) $Zr^+OCH_2CH_2CH_2B^-(C_6F_5)_3$;

dimethylsilanediyl(2-methylbenzindenyl)(2-methylindenyl) $Zr^+OCH_2CH_2CH_2B^-(C_6F_5)_3$;

dimethylsilanediyl(2-methylbenzindenyl)(2-methyl-4-phenylindenyl) $Zr^+OCH_2CH_2CH_2B^-(C_6F_5)_3$;

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl) $Zr^+OCH_2CH_2CH_2B^-(C_6F_5)_3$;

dimethylsilanediylbis(2-methyl-4-phenylindenyl)Zr⁺ OCH₂ CH₂ CH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl)Zr⁺ OCH₂ CH₂ CH₂ B⁻
(C₆ F₅)₃;

dimethylsilanediylbis(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediylbisindenylZr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methylbenzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂
B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)Zr⁺ CH₂
CHCHCH₂ CH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻
(CF₃)₃;

dimethylsilanediylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻
(CF₃)₃;

dimethylsilanediylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methylindenyl)Zr⁺ CH₂ C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediylbisindenylZr⁺ CH₂ C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methylbenzoindenyl)Zr⁺ CH₂ C(CH₃)C(CH₃)CH₂ B⁻
(CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methylindenyl)Zr⁺ CH₂

C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)Zr⁺ CH₂

$\text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{CH}_2 \text{B}^- (\text{CF}_3)_3;$

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl) $\text{Zr}^+ \text{CH}_2$

$\text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{CH}_2 \text{B}^- (\text{CF}_3)_3;$

dimethylsilanediylbis(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{CH}_2 \text{B}^- (\text{CF}_3)_3;$

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl) $\text{Zr}^+ \text{CH}_2$

$\text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{C}_2 \text{B}^- (\text{CF}_3)_3;$

dimethylsilanediylbis(2-methyl-4-naphthylindenyl) $\text{Zr}^+ \text{CH}_2 \text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{CH}_2 \text{B}^- (\text{CF}_3)_3;$

methylphenylmethylene(fluorenyl)(cyclopentadienyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

diphenylmethylene(fluorenyl)(cyclopentadienyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

isopropylidene(3-methylcyclopentadienyl)(fluorenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

dimethylsilanediyl(3-tert-butylcyclopentadienyl)(fluorenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

diphenylsilanediyl(3-(trimethylsilyl)cyclopentadienyl)(fluorenyl) $\text{Zr}^+ \text{CH}_2$

$\text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediylbis(2-methylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediylbisindenyl $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediylbis(2-methyl-4,5-benzoidindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediyl(2-methyl-4,5-benzoidindenyl)(2-methylindenyl) $\text{Zr}^+ \text{CH}_2$

$\text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediyl(2-methyl-4,5-benzoindenyl)(2-methyl-4-phenylindenyl)

$\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediyl(2-methylindenyl)(4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2$
 $\text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediylbis(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6$
 $\text{F}_5)_3;$

phenylmethylsilanediylbis(2-ethyl-4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6$
 $\text{F}_5)_3;$

phenylmethylsilanediylbis(2-methyl-4,6-diisopropylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2$
 $\text{B}^- (\text{C}_6 \text{F}_5)_3;$

phenylmethylsilanediylbis(2-methyl-4-naphthylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^-$
 $(\text{C}_6 \text{F}_5)_3;$

ethylenebis(2-methylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylenebisindenyl $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylenebis(2-methyl-4,5-benzoindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylene(2-methyl-4,5-benzoindenyl)(2-methylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^-$
 $(\text{C}_6 \text{F}_5)_3;$

ethylene(2-methyl-4,5-benzoindenyl)(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{CH}_2$
 $\text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylene(2-methylindenyl)(4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylenebis(2-methyl-4,5-benzoindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylenebis(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3;$

ethylenebis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-ethyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-ethyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2,3,5-trimethylcyclopentadienyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

1, 6-{bis[methylsilylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilylbis(2-methyl-4,5-benzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilyl(2-methyl-4-phenylindenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,2-{bis[methylsilylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane;

1,2-{bis[methylsilylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane;

1,2-{bis[methylsilylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane;

$(F_5)_3 \}} \text{ethane};$

1,2-{bis[methylsilylbis(2-methyl-4,5-benzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆

$F_5)_3 \}} \text{ethane};$ and

1,2-{bis[methylsilyl(2-methyl-4-phenylindenyl)(2-methylindenyl)Zr⁺ CH₂

CHCHCH₂ B⁻ (C₆ F₅)₃ }}ethane.

19. (original) The catalyst as claimed in claim 8, wherein the transition metal compound of the formula I is selected from the group consisting of

bis(cyclopentadienyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

bis(methylcyclopentadienyl)Zr⁺ C₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

bis(n-butylcyclopentadienyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

bisindenylZr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

(tert-butylamido)dimethyl(tetramethyl-η⁵-cyclopentadienyl)silaneZr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

bis(2-methylbenzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbisindenylZr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-methylbenzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻
(C₆ F₅)₃;

dimethylsilanediylbis(2-methylbenzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂
B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)Zr⁺ CH₂
CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻
(CF₃)₃;

dimethylsilanediylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻
(CF₃)₃;

dimethylsilanediylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methylindenyl)Zr⁺ CH₂ C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediylbisindenylZr⁺ CH₂ C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methylbenzoindenyl)Zr⁺ CH₂ C(CH₃)C(CH₃)CH₂ B⁻
(CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methylindenyl)Zr⁺ CH₂
C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)Zr⁺ CH₂
C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl)Zr⁺ CH₂

$\text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{CH}_2 \text{B}^- (\text{CF}_3)_3$;
dimethylsilanediylbis(2-methyl-4-naphthylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
isopropylidene(cyclopentadienyl)(fluorenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
isopropylidene(cyclopentadienyl)(indenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
 $[4-\eta^5\text{-cyclopentadienyl-4,7,7-trimethyl-(}\eta^5\text{-4,5,6,7-tetrahydroindenyl)}]\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediylbis(2-methylindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediylbisindenyl $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{C}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediylbis(2-methylbenzoindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediyl(2-methylbenzoindenyl)(2-methylindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediyl(2-methylindenyl)(4-phenylindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediylbis(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl) $\text{Zr}^+ \text{OCH}_2 \text{CH}_2 \text{CH}_2 \text{B}^- (\text{C}_6 \text{F}_5)_3$;
dimethylsilanediylbis(2-methylindenyl) $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{CF}_3)_3$;
dimethylsilanediylbisindenyl $\text{Zr}^+ \text{CH}_2 \text{CHCHCH}_2 \text{B}^- (\text{CF}_3)_3$;
dimethylsilanediylbis(2-methyl-4-phenylindenyl) $\text{Zr}^+ \text{CH}_2 \text{C}(\text{CH}_3)\text{C}(\text{CH}_3)\text{CH}_2 \text{B}^- (\text{CF}_3)_3$;

dimethylsilanediylbis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂

C(CH₃)C(CH₃)CH₂ B⁻ (CF₃)₃;

dimethylsilanediylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ C(CH₃)C(CH₃)CH₂

B⁻ (CF₃)₃;

methylphenylmethylene(fluorenyl)(cyclopentadienyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆

F₅)₃;

diphenylmethylene(fluorenyl)(cyclopentadienyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

isopropylidene(3-methylcyclopentadienyl)(fluorenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆

F₅)₃;

dimethylsilanediyl(3-tert-butylcyclopentadienyl)(fluorenyl)Zr⁺ CH₂ CHCHCH₂

B⁻ (C₆ F₅)₃;

diphenylsilanediyl(3-(trimethylsilyl)cyclopentadienyl)(fluorenyl)Zr⁺ CH₂

CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbis(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbisindenylZr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbis(2-methyl-4,5-benzoidindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆

F₅)₃;

phenylmethylsilanediyl(2-methyl-4,5-benzoidindenyl)(2-methylindenyl)Zr⁺ CH₂

CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediyl(2-methyl-4,5-benzoidindenyl)(2-methyl-4-phenylindenyl)

Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediyl(2-methylindenyl)(4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂

B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

phenylmethylsilanediylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebisindenylZr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methyl-4,5-benzoidenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylene(2-methyl-4,5-benzoidenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylene(2-methyl-4,5-benzoidenyl)(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylene(2-methylindenyl)(4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methyl-4,5-benzoidenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-ethyl-4,6-diisopropylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

ethylenebis(2-ethyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

dimethylsilanediylbis(2,3,5-trimethylcyclopentadienyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃;

1, 6-{bis[methylsilylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilylbis(2-methyl-4,5-benzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,6-{bis[methylsilyl(2-methyl-4-phenylindenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}hexane;

1,2-{bis[methylsilylbis(2-methyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane;

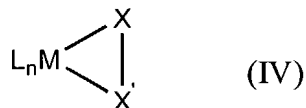
1,2-{bis[methylsilylbis(2-ethyl-4-phenylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane;

1,2-{bis[methylsilylbis(2-methyl-4-naphthylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane;

1,2-{bis[methylsilylbis(2-methyl-4,5-benzoindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane; and

1,2-{bis[methylsilyl(2-methyl-4-phenylindenyl)(2-methylindenyl)Zr⁺ CH₂ CHCHCH₂ B⁻ (C₆ F₅)₃]}ethane.

20. (original) The compound as claimed in claim 1, wherein M is zirconium.
21. (original) The compound as claimed in claim 1, wherein M is a metal atom group IVb of the Periodic Table of Elements.
22. A transition metal compound of the formula IV



wherein

- L are identical or different and are each a substituted π ligand,
- n is equal to 1, 2, 3, or 4,
- M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,
- X is a heteroatom or a hydrocarbon group having 1-40 carbon atoms,
- X' is a hydrocarbon group having 1-40 carbon atoms.

23. The transition metal compound as claimed in claim 22, wherein the radicals L are identical or different and are each a substituted cyclopentadienyl group.

24. The transition metal compound as claimed in claim 22, wherein the radicals L are linked to one another via a bridge.
25. The transition metal compound as claimed in claim 22, wherein n is 2 when M is a metal atom of group IVb of the Periodic Table of the Elements.
26. The transition metal compound as claimed in claim 22, wherein
M is a metal atom of group IVb of the Periodic Table of the Elements, n is equal to
2,
L are identical or different and are each a substituted cyclopentadienyl group,
where two radicals L are optionally linked to one another via a bridge Z and
Z is CR²R³ or SiR²R³ or a unit Si-(CR²R³)_x-Si which links two fragments
L_nMXX'A-R¹_m with one another, where x is an integer from 0 to 10,
X and X' together form a three-membered to five-membered hydrocarbon chain which
can be saturated or unsaturated and are unsubstituted or substituted by one or
more C₁-C₂₀-hydrocarbon radicals,
R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a
C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-
aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl
group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl
group, or R² and R³ together with the atoms connected them form one or more
rings, and R² and R³ are optionally bonded to L.

27. The transition metal compound as claimed in claim 22, wherein

M is zirconium,

n is equal to 2,

L are identical or different and are each a substituted cyclopentadienyl group,

where two radicals L are linked to one another via a bridge Z, where Z is

CR²R³ or SiR²R³ and

R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a

C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-

aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl

group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl

group, or R² and R³ together with the atoms connected them form one or more

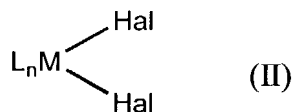
rings, and R² and R³ are optionally bonded to L,

X and X' together form an unsaturated four-membered hydrocarbon chain whose

hydrogen atoms are optionally replaced by C₁-C₂₀-alkyl groups.

28. A process for preparing the compound as claimed in claim 22,

which comprises reacting a compound of the formula II



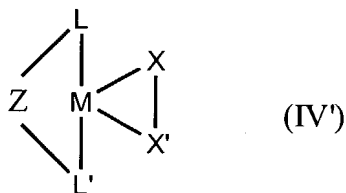
with a compound of the formula III



and reacting the reaction product with a compound of the formula AR_m^I , where L, n,

M, X and X' in the formulae II and III are defined for the formula IV and Hal is a halogen atom.

29. A transition metal compound of the formula IV'



where

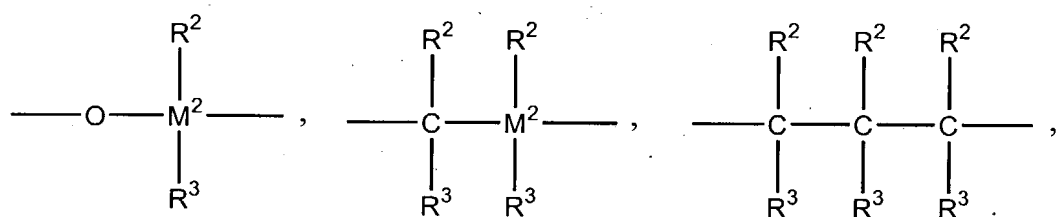
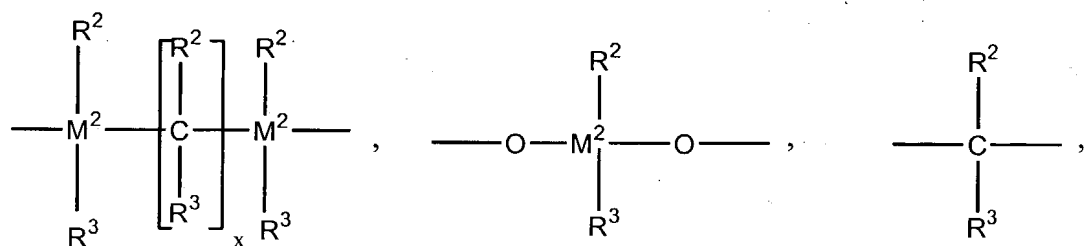
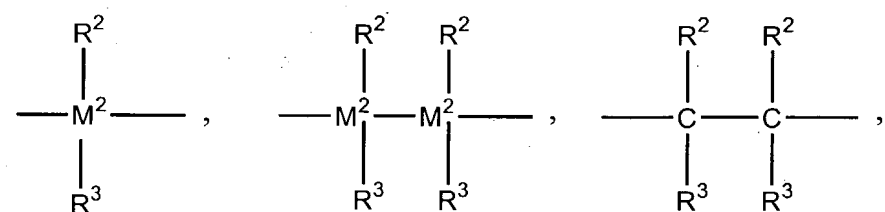
L and L' are identical or different and are each a π ligand or an electron donor,

M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,

X is a heteroatom or a hydrocarbon group having 1-40 carbon atoms,

X' is a hydrocarbon group having 1-40 carbon atoms,

Z is



$=\text{BR}_2$, $-\text{AlR}^2$, $-\text{Ge}-$, $-\text{O}-$, $-\text{S}-$, $=\text{SO}$, $=\text{SO}_2$, $-\text{NR}_2$, $=\text{CO}$, $=\text{PR}^2$ or $=\text{P}(\text{O})\text{R}^2$, where R^2

and R^3 are identical or different and are each a hydrogen atom, a halogen atom,

a C_1 - C_{20} -alkyl group, a C_1 - C_1 -fluoroalkyl group, a C_1 - C_{10} -alkoxy group, a C_6 -

C_{14} -aryl group, a C_6 - C_{10} -fluoroaryl group, a C_6 - C_{10} -aryloxy group, a C_2 - C_{10} -

alkenyl group, a C_7 - C_{40} -arylalkyl group, a C_7 - C_{40} -alkylaryl group, a C_8 - C_{40} -

arylalkenyl group and x is a number from zero to 18, or R^2 and R^3 together with

the atoms-connecting them form one or more rings and R^2 or/and R^3 can be

bonded to L and M^2 is silicon, germanium or tin.

30. The transition metal compound as claimed in claim 29, wherein the radicals L are identical or different and are each an unsubstituted or substituted cyclopentadienyl group.
31. The transition metal compound as claimed in claim 29, wherein the radicals L are linked to one another via a bridge.
32. The transition metal compound as claimed in claim 29, wherein n is 2 when M is a metal atom of group IVb of the Periodic Table of the Elements.
33. The transition metal compound as claimed in claim 29, wherein
M is a metal atom of group IVb of the Periodic Table of the Elements, n is equal to
2,
L are identical or different and are each a substituted or unsubstituted
cyclopentadienyl group, where two radicals L are optionally linked to one
another via a bridge Z and
Z is CR²R³ or SiR²R³ or a unit Si-(CR²R³)_x-Si which links two fragments
L_nM'XX'A-R_m¹ with one another, where x is an integer from 0 to 10,
X and X' together form a three-membered to five-membered hydrocarbon chain which
can be saturated or unsaturated and are unsubstituted or substituted by one or
more C₁-C₂₀-hydrocarbon radicals,

R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl group, or R² and R³ together with the atoms connected them form one or more rings, and R² and R³ are optionally bonded to L.

34. The transition metal compound as claimed in claim 29, wherein

M is zirconium,

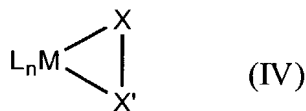
n is 2,

L are identical or different and are each a substituted cyclopentadienyl group, where two radicals L are linked to one another via a bridge Z, where Z is CR²R³ or SiR²R³,

R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl group, or R² and R³ together with the atoms connected them form one or more rings, and R² and R³ are optionally bonded to L.

X and X' together form an unsaturated four-membered hydrocarbon chain whose hydrogen atoms are optionally replaced by C₁-C₂₀-alkyl groups.

35. A transition metal compound of the formula IV



wherein

L are different if n is 2, 3 or 4, and are each a π ligand or electron donor,

n is equal to 1, 2, 3, or 4,

M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,

X is a heteroatom or a hydrocarbon group having 1-40 carbon atoms,

X' is a hydrocarbon group having 1-40 carbon atoms.

36. The transition metal compound as claimed in claim 35, wherein the radicals L are different and are each an unsubstituted or substituted cyclopentadienyl group.

37. The transition metal compound as claimed in claim 35, wherein the radicals L are linked to one another via a bridge.

38. The transition metal compound as claimed in claim 35, wherein n is 2 when M is a metal atom of group IVb of the Periodic Table of the Elements.

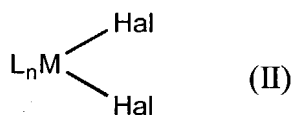
39. The transition metal compound as claimed in claim 35, wherein
M is a metal atom of group IVb of the Periodic Table of the Elements, n is equal to
2,
L are different and are each a substituted or unsubstituted cyclopentadienyl group,
where two radicals L are optionally linked to one another via a bridge Z and
Z is CR²R³ or SiR²R³ or a unit Si-(CR²R³)_x-Si which links two fragments
L_yM'XX'A-R¹_m with one another, where x is an integer from 0 to 10,
X and X' together form a three-membered to five-membered hydrocarbon chain which
can be saturated or unsaturated and are unsubstituted or substituted by one or
more C₁-C₂₀-hydrocarbon radicals,
R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a
C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-
aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl
group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl
group, or R² and R³ together with the atoms connected them form one or more
rings, and R² and R³ are optionally bonded to L.
40. The transition metal compound as claimed in claim 35, wherein
M is zirconium,
n is 2,

L are different and are each a substituted cyclopentadienyl group, where two radicals L are linked to one another via a bridge Z, where Z is CR²R³ or SiR²R³ and

R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl group, or R² and R³ together with the atoms connected them form one or more rings, and R² and R³ are optionally bonded to L.

X and X' together form an unsaturated four-membered hydrocarbon chain whose hydrogen atoms are optionally replaced by C₁-C₂₀-alkyl groups.

41. A process for preparing the compound as claimed in claim 35, which comprises reacting a compound of the formula II



with a compound of the formula III

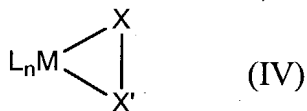


and reacting the reaction product with a compound of the formula AR_m^1 , where L, n,

M, X and X' in the formulae II and III are defined for the formula IV,

Hal is a halogen atom.

42. A transition metal compound of the formula IV



wherein

L are identical or different and are each a π ligand or electron donor,

n is equal to 1, 2, 3, or 4,

M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,

X is a heteroatom, a C_6-C_{14} -aryl group, a C_7-C_{40} -arylalkyl group, a C_7-C_{40} -alkylaryl group or a C_8-C_{40} -arylalkenyl group,

X' or a hydrocarbon group having 1-40 carbon atoms.

43. The transition metal compound as claimed in claim 42, wherein the radicals L are different and are each an unsubstituted or substituted cyclopentadienyl group.
44. The transition metal compound as claimed in claim 42, wherein the radicals L are linked to one another via a bridge.
45. The transition metal compound as claimed in claim 42, wherein n is 2 when M is a metal atom of group IVb of the Periodic Table of the Elements.
46. The transition metal compound as claimed in claim 42, wherein
M is a metal atom of group IVb of the Periodic Table of the Elements, n is equal to
2,
L are different and are each a substituted or unsubstituted cyclopentadienyl group,
where two radicals L are optionally linked to one another via a bridge Z and
Z is CR²R³ or SiR²R³ or a unit Si-(CR²R³)_x-Si which links two fragments
L_nM'XX'A-R¹_m with one another, where x is an integer from 0 to 10,
X and X' together form a three-membered or five-membered hydrocarbon chain which
can be saturated or unsaturated and are unsubstituted or substituted by one or
more C₁-C₂₀-hydrocarbon radicals,
R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a
C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-

aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl group, or R² and R³ together with the atoms connected them form one or more rings, and R² and R³ are optionally bonded to L.

47. The transition metal compound as claimed in claim 42, wherein

M is zirconium,

n is 2,

L are different and are each a substituted cyclopentadienyl group, where two radicals L are linked to one another via a bridge Z, where Z is CR²R³ or SiR²R³ and

R² and R³ are identical or different and are each a hydrogen atom, a halogen atom, a C₁-C₂₀-alkyl group, a C₁-C₁₀-fluoralkyl group, a C₁-C₁₀-alkoxy group, a C₆-C₁₄-aryl group, a C₆-C₁₀-fluoroaryl group, a C₆-C₁₀-aryloxy group, a C₂-C₁₀-alkenyl group, a C₇-C₄₀-arylalkyl group, a C₇-C₄₀-alkylaryl group, a C₈-C₄₀-arylalkenyl group, or R² and R³ together with the atoms connected them form one or more rings, and R² and R³ are optionally bonded to L.

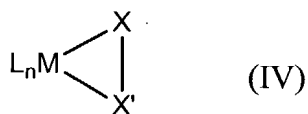
48. A compound selected from the group consisting of

Bis(methylcyclopentadienyl)ZrCH₂CHCHCH₂;
Bis(n-butyl-cyclopentadienyl)ZrCH₂CHCHCH₂;
BisindenylZrCH₂CHCHCH₂;
(tert.butylamido)dimethyl(tetramethyl- η^5 -cyclopentadienyl)sil-
lan-Zr⁺CH₂CHCHCH₂;
Bis(2-methylbenzoindenyl)ZrCH₂CHCHCH₂;
Dimethylsilandiylbis(2-methyl-indenyl)ZrCH₂CHCHCH₂;
DimethylsilandiylbisindenylZr⁺CH₂CHCHCH₂;
Dimethylsilandiylbis(2-methylbenzoindenyl)ZrCH₂CHCHCH₂;
Dimethylsilandiyl(2-methylbenzoindenyl)(2-methyl-indenyl)
ZrCH₂CHCHCH₂;
Dimethylsilandiyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)
ZrCH₂CHCHCH₂;
Dimethylsilandiyl(2-methylindenyl)(4-phenylindenyl)ZrCH₂CHCHCH₂;
Dimethylsilandiylbis(2-methyl-4-phenyl-indenyl)ZrCH₂CHCHCH₂;
Dimethylsilandiylbis(2-methyl-4,6-diisopropyl-indenyl)Zr⁺
CH₂CHCHCH₂;
Dimethylsilaniylbis(2-methyl-4-naphtyl-indenyl)ZrCH₂CHCHCH₂;
Isopropyliden(cyclopentadienyl)(fluorenyl)ZrCH₂CHCHCH₂;
Isopropyliden(cyclopentadienyl)(indenyl)ZrCH₂CHCHCH₂;
[4-(η^5 -Cyclopentadienyl)-4,7,7-trimethyl-(η^5 -4.5.6.7-tetrahydro-
indenyl)ZrCH₂CHCHCH₂;
Dimethylsilandiylbis(2-methyl-indenyl)ZrOCH₂CH₂CH₂;
DimethylsilandiylbisindenylZrOCH₂CH₂CH₂;
Dimethylsilandiylbis(2-methylbenzoindenyl)ZrOCH₂CH₂CH₂;
Dimethylsilandiyl(2-methylbenzoindenyl)(2-methyl-indenyl)
ZrOCH₂CH₂CH₂;
Dimethylsilandiyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)
ZrOCH₂CH₂CH₂;
Dimethylsilandiyl(2-methylindenyl)(4-phenylindenyl)ZrOCH₂CH₂CH₂;
Dimethylsilandiylbis(2-methyl-4-phenyl-indenyl)ZrOCH₂CH₂CH₂;
Dimethylsilandiylbis(2-methyl-4,6-diisopropyl-indenyl)
ZrOCH₂CH₂CH₂;
Dimethylsilandiylbis(2-methyl-indenyl)ZrCH₂C(CH₃)C(CH₃)CH₂;
DimethylsilandiylbisindenylZrCH₂C(CH₃)C(CH₃)CH₂;
Dimethylsilandiylbis(2-methylbenzoindenyl)Zr⁺CH₂C(CH₃)C(CH₃)CH₂;
Dimethylsilandiyl(2-methylbenzoindenyl)(2-methyl-indenyl)
ZrCH₂C(CH₃)C(CH₃)CH₂;
Dimethylsilandiyl(2-methylbenzoindenyl)(2-methyl-4-phenylindenyl)
ZrCH₂C(CH₃)C(CH₃)CH₂;

Dimethylsilandiyl(2-methylindenyl)(4-phenylindenyl)
ZrCH₂C(CH₃)C(CH₃)CH₂;
Dimethylsilandiylbis(2-methyl-4-phenyl-indenyl)
ZrCH₂C(CH₃)C(CH₃)CH₂;
Dimethylsilandiylbis(2-methyl-4,6-diisopropyl-indenyl)
ZrCH₂C(CH₃)C(CH₃)CH₂;
Dimethylsilaniylbis(2-methyl-4-naphtyl-indenyl)
ZrCH₂C(CH₃)C(CH₃)CH₂;
Methylphenylmethylen-(fluorenyl)(cyclopentadienyl)ZrCH₂CHCHCH₂;
Diphenylmethylen-(fluorenyl)(cyclopentadienyl)ZrCH₂CHCHCH₂;
Isopropyliden-(3-methylcyclopentadienyl)(fluorenyl)
ZrCH₂CHCHCH₂B⁻(C₆F₅)₃;
Dimethylsilandiyl-(3-tert.-Butylcyclopentadienyl)(fluorenyl)
ZrCH₂CHCHCH₂;
Diphenylsilandiyl-(3-(trimethylsilyl)cyclopentadienyl)(fluorenyl)
ZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(e-methyl-indenyl)ZrCH₂CHCHCH₂;
PhenylmethylsilandiylbisindenylZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(2-methyl-4,5-benzoidindenyl)ZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(2-methyl-4,5-benzoidindenyl)(2-methyl
-indenyl)ZrCH₂CHCHCH₂;
Phenylmethylsilandiyl(2-methyl-4,5-benzoidindenyl)(2-methyl-4
-phenylindenyl)ZrCH₂CHCHCH₂;
Phenylmethylsilaniyl(2-methylindenyl)(4-phenylindenyl)
ZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(2-methyl-4-phenyl-indenyl)ZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(2-ethyl-4-phenyl-indenyl)ZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(2-methyl-4,6-diisopropyl-indenyl)
ZrCH₂CHCHCH₂;
Phenylmethylsilandiylbis(2-methyl-4-naphtyl-indenyl)ZrCH₂CHCHCH₂;
Ethylenbis(2-methyl-indenyl)ZrCH₂CHCHCH₂;
EthylenbisindenylZrCH₂CHCHCH₂;
Ethylenbis(2-methyl-4,5-benzoidindenyl)ZrCH₂CHCHCH₂;
Ethylen(2-methyl-4,5-benzoidindenyl)(2-methyl-indenyl)ZrCH₂CHCHCH₂;
Ethylen(2-methyl-4,5-benzoidindenyl)(2-methyl-4-phenylindenyl)
ZrCH₂CHCHCH₂;
Ethylen(2-methylindenyl)(4-phenylindenyl)ZrCH₂CHCHCH₂;
Ethylenbis(2-methyl-4,5-benzoidindenyl)ZrCH₂CHCHCH₂;
Ethylenbis(2-methyl-4-phenyl-indenyl)ZrCH₂CHCHCH₂;
Ethylenbis(2-methyl-4,6-diisopropyl-indenyl)ZrCH₂CHCHCH₂;

Ethylenbis (2-methyl-4-naphtyl-indenyl) ZrCH₂CHCHCH₂;
Ethylenbis (2-ethyl-4-phenyl-indenyl) ZrCH₂CHCHCH₂;
Ethylenbis (2-ethyl-4,6-diisopropyl-indenyl) ZrCH₂CHCHCH₂;
Ethylenbis (2-ethyl-4-naphtyl-indenyl) ZrCH₂CHCHCH₂;
Dimethylsilandiylbis (2-ethyl-4-phenyl-indenyl) ZrCH₂CHCHCH₂;
Dimethylsilandiylbis (2,3,5-trimethylcyclopentadienyl)
ZrCH₂CHCHCH₂;
1,6- {Bis [methylsilyl-bis (2-methyl-4-phenyl-indenyl) Zr+CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } hexan;
1,6- {Bis [methylsilyl-bis (2-ethyl-4-phenyl-indenyl)
Zr+CH₂CHCHCH₂B⁻ (C₆F₅)₃] } hexan;
1,6- {Bis [methylsilyl-bis (2-methyl-4-naphtyl-indenyl) Zr+CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } hexan;
1,6- {Bis [methylsilyl-bis (2-methyl-4,5-benzoindenyl) Zr⁺CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } hexan;
1,6- {Bis [methylsilyl- (2-methyl-4-phenyl-indenyl) (2-methyl-inde-
nyl) Zr⁺CH₂CHCHCH₂B⁻ (C₆F₅)₃] } hexan;
1,2- {Bis [methylsilyl-bis (2-methyl-4-phenyl-indenyl) Zr⁺CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } ethan;
1,2- {Bis [methylsilyl-bis (2-ethyl-4-phenyl-indenyl) Zr⁺CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } ethan;
1,2- {Bis [methylsilyl-bis (2-methyl-4-naphtyl-indenyl) Zr⁺CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } ethan;
1,2- {Bis [methylsilyl-bis (2-methyl-4,5-benzoindenyl) Zr⁺CH₂CHCHCH₂
B⁻ (C₆F₅)₃] } ethan; and
1,2- {Bis [methylsilyl- (2-methyl-4-phenyl-indenyl) (2-methyl-inde-
nyl) Zr⁺CH₂CHCHCH₂B⁻ (C₆F₅)₃] } ethan.

49. A transition metal compound of the formula IV



wherein

L are identical or different and are each a π ligand or electron donor,

n is equal to 1, 2, 3, or 4,

M is a metal atom of group IIIb, IVb, Vb or VIb of the Periodic Table of the Elements,

X is a heteroatom or a hydrocarbon group having 1-40 carbon atoms,

X' is a hydrocarbon group having 1-40 carbon atoms,

with the proviso that at least one L is a substituted or unsubstituted indenyl.

50. The transition metal compound as claimed in claim 49, wherein the radicals L are linked to one another via a bridge.

51. The transition metal compound as claimed in claim 49, wherein n is 2 when M is a metal atom of group IVb of the Periodic Table of the Elements.

52. The transition metal compound as claimed in claim 49, wherein

M is a metal atom of group IVb of the Periodic Table of the Elements, n is equal to 2,

where two radicals L are optionally linked to one another via a bridge Z and

Z is CR^2R^3 or SiR^2R^3 or a unit $\text{Si}-(\text{CR}^2\text{R}^3)_x-\text{Si}$ which links two fragments

$\text{L}_n\text{M}'\text{XX}'\text{A}-\text{R}^1_m$ with one another, where x is an integer from 0 to 10,

R^2 and R^3 are identical or different and are each a hydrogen atom, a halogen atom, a

$\text{C}_1\text{-C}_{20}$ -alkyl group, a $\text{C}_1\text{-C}_{10}$ -fluoralkyl group, a $\text{C}_1\text{-C}_{10}$ -alkoxy group, a $\text{C}_6\text{-C}_{14}$ -

aryl group, a $\text{C}_6\text{-C}_{10}$ -fluoroaryl group, a $\text{C}_6\text{-C}_{10}$ -aryloxy group, a $\text{C}_2\text{-C}_{10}$ -alkenyl

group, a $\text{C}_7\text{-C}_{40}$ -arylalkyl group, a $\text{C}_7\text{-C}_{40}$ -alkylaryl group, a $\text{C}_8\text{-C}_{40}$ -arylalkenyl

group, or R^2 and R^3 together with the atoms connected them form one or more

rings, and R^2 and R^3 are optionally bonded to L.

53. The transition metal compound as claimed in claim 49, wherein

M is zirconium,

n is 2,

where two radicals L are linked to one another via a bridge Z, wherein

Z is CR^2R^3 or SiR^2R^3 and

R^2 and R^3 are identical or different and are each a hydrogen atom, a halogen atom, a

$\text{C}_1\text{-C}_{20}$ -alkyl group, a $\text{C}_1\text{-C}_{10}$ -fluoralkyl group, a $\text{C}_1\text{-C}_{10}$ -alkoxy group, a $\text{C}_6\text{-C}_{14}$ -

aryl group, a $\text{C}_6\text{-C}_{10}$ -fluoroaryl group, a $\text{C}_6\text{-C}_{10}$ -aryloxy group, a $\text{C}_2\text{-C}_{10}$ -alkenyl

group, a $\text{C}_7\text{-C}_{40}$ -arylalkyl group, a $\text{C}_7\text{-C}_{40}$ -alkylaryl group, a $\text{C}_8\text{-C}_{40}$ -arylalkenyl

group, or R^2 and R^3 together with the atoms connected them form one or more rings, and R^2 and R^3 are optionally bonded to L.